

## ORIGINAL RESEARCH

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# Can number of platelets, blood red cell distribution, volume of neutrophil/lymphocyte ratio and mean platelet volume in patients with systemic lupus erythematosus and sjögren be used as an inflammation marker?

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### Abstract

Sjögren's syndrome (SS) and systemic lupus erythematosus (SLE) are autoimmune rheumatic diseases that can cause significant organ involvements. Hematological indices such as Platelet Count (PLT), Blood Red Cell Distribution Volume (RDW), Neutrophil/Lymphocyte Ratio (NLR), and Mean Platelet Volume (MPV) can be assessed by a simple haemogram test. These parameters may be related to the activity of the patient's other diseases, such as cardiovascular diseases and inflammatory diseases. Our aim in this study is to demonstrate the possible association of hematologic markers such as PLT, RDW, NLR, MPV with the disease activity. 40 patients diagnosed with SS and 40 patients diagnosed with SLE followed in the physical medicine and rehabilitation and internal medicine rheumatology polyclinics and 40 healthy volunteers were included in the study. Laboratory findings were obtained from routine polyclinic controls. RDW, MPV, NLR ratios and platelet counts were calculated from the results of whole blood counts (CBC). RDW, MPV, NLR, and PLT were expressed as medians (minimum-maximum). Epidemiological data and RDW, MPV, NLR, PLT values of the cases included in the study were compared. Among the patients with SS and SLE, RDW, NLR and MPV values were higher than in the healthy control group. However, the elevation in the RDW was statistically significant while the height in the MPV and NLR was not statistically significant. Although studies with further patient participation are necessary, hematologic markers can be used in the diagnosis and follow-up of rheumatic diseases as they are both inexpensive and can be utilized extensively.

**Keywords:** Sjögren's syndrome, systemic lupus erythematosus, hematological indices

### Introduction

Systemic lupus erythematosus (SLE) is a connective tissue illness which afflicts many organs and systems with autoimmune features, along with chronic, unexplained, immunologic disorders [1]. The disease was diagnosed with findings from fever, swelling in joints, erythematous skin rashes to dysfunction in kidneys, central nervous system, lungs and other organs and systems. It is thought that the frequency of SLE is 15-40 / 100.000, depending on the specifications of the research group (age, sex, etc.) and duration of study-dependent changes [1]. Sjögren's syndrome (SS) is an integral chronic disease defined by lymphocytic pervades in exocrine organs. The disease generally afflicts females and the average age at starting period is 50-60. Many people with Sjögren's disorder also have the symptoms of sicca, for example xerophthalmia, xerostomia and parotid gland enlargement [2].

Irregular immune arrangement and insistent inflammation, the certain features of chronic inflammatory disorders, have negative outcomes on hematopoietic system. Variations in peripheral blood cell elements are used to determine illness activity and to diagnose some collagen tissue illnesses for instance rheumatoid arthritis (RA) [3-5]. Rheumatic inflammatory illnesses afflict usually more than one cellular pathways of hematological system, and therefore, such common hematologic findings as anemia, neutropenia, thrombocytopenia and hematological malignancies are seen in such disorders. Those hematological abnormalities are because of many immunological and non-immune mediated systems. The reasons of hematologic abnormalities are overproduction of cytokines, antibodies, immune problems, growth factor defects, expansion of peripheral accumulation, low life span, declined neutrophil function, gastrointestinal troubles, drug-related toxicity [3-8]. SLE [6,7] and other inflammatory diseases [3,5,8-11] affect the amount, rate and volume of peripheral blood cells. Mean platelet volume (MPV) is a whole blood cell count (CBC) parameter. It shows the functionality and activity of platelets and is studied in a lot of inflammatory, cardiovascular, and cerebrovascular illnesses

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[3,6,8,10,12]. More granules exist in large platelets than small ones. These discharge prothrombotic components like thromboxane A<sub>2</sub>, serotonin,  $\beta$ -thromboglobulin and adenosine triphosphate, and influence inflammatory and endothelial functionalities. It involves the explanation of adhesion components like P-selectin and glycoprotein IIb / IIIa and rises vasoconstriction as well [10].

New studies have demonstrated that amount and rates of subgroups of the blood cell change in inflammatory rheumatic illnesses [5,6,11]. But, the affiliation between hematological indices and rheumatologic illnesses is still controversial [3-6,12-14]. We therefore aimed to investigate the possible association of changes in platelet (PLT) count, blood red cell distribution volume (RDV), Neutrophil / Lymphocyte ratio (NLR) and mean platelet volume (MPV) in people with SLE and SS with these two rheumatic inflammatory diseases.

## Material and Methods

Forty SS, 40 SLE patients and 40 healthy volunteers who applied to the rheumatology polyclinic of Physical Medicine and Rehabilitation and Internal Medicine were included in the study [14-18]. Exclusion criteria of the study; Patients under 18 and over 80 years, patients with inflectional diseases, pregnancy, antiplatelet drugs like aspirin and clopidogrel, atherosclerotic diseases, dyslipidemia, diabetes mellitus and hypertension. This present research was accepted by local ethics committee and informed consent forms and permits were obtained from all participants before joining the study. Epidemiological data such as detailed stories, age, sex, and laboratory values of whole participants were routinely obtained from desired medical reports during the control. The numbers of RDW, MPV, NLR and PLT were calculated from full blood count results.

Statistical analyzes were performed using the SPSS 22 program (SPSS, Chicago, Ill., USA). The results are shown as mean  $\pm$

standard deviation. Variables' normal distribution was assessed by the Kolmogorov-Smirnov test and the crossover distributions (RDW, MPV, NLR and PLT number) were explained as median (minimum-maximum). Statistical differentiates between the groups were analyzed by one-way variance analysis (ANOVA) followed by Tukey's post hoc test for parametric data, Kruskal-Wallis and post hoc Mann-Whitney U tests were valued as nonparametric. A  $\chi^2$  test was used to compare categorical changes. Correlation analysis was done by using the Pearson correlation coefficient. P value <0.05 was granted significant.

## Results

The demographic, laboratory and clinical findings of the participant groups included in the study are summarized in table 1. Of the total 120 individuals studied, 40 were healthy control groups, 40 were SS and 40 were SLE patients. Of the patients with SS diagnosis, 37 were female, 3 were male, 34 of SLE patients were female, 6 were male and 21 of the control group were women and 19 were men. Mean age of groups, SS, SLE and control groups were; 49.33 $\pm$ 12.96; 40.65 $\pm$ 10.23; 35.75 $\pm$ 11.72 years. The disease duration of the patient groups was 8.5 $\pm$ 5.8 for SS and SLE, respectively; 4.6 $\pm$ 5.2 years. Body mass index (BMI) of SS, SLE and control groups were respectively; 25.4 $\pm$ 5; 25.1 $\pm$ 8.1; 27.4 $\pm$ 4.8 kg/m<sup>2</sup>.

RDW, MPV, NLR and PLT numbers were as follows. The results of RDW, MPV, NLR and PLT of patients with SS were 14.83 $\pm$ 2%; 8.64 $\pm$ 1.14; 2.3 $\pm$ 0.83 and 269950.00 $\pm$ 72527.60 / $\mu$ L; The results of RDW, MPV, NLR and PLT in patients with SLE were 15.1 $\pm$ 2.4%; 8.67 $\pm$ 1.12; 2.72 $\pm$ 1.49 and 268275.00 $\pm$ 89160.18 / $\mu$ L, while the results of RDW, MPV, NLR and PLT of the healthy control group were 13.59 $\pm$ 0.95%, respectively; 8.28 $\pm$ 0.74  $\mu$ L; 2.28 $\pm$ 1.6 and 272900.00 $\pm$ 64202.32 / $\mu$ L. The erythrocyte sedimentation rates (ESR) of Sjögren, SLE and control groups were 21, 38 and 15 mm/h; C reactive protein (CRP) values were respectively 0.40; 0.10; 0.30 mg/dl.

**Table 1.** Clinical and laboratory data in the study groups \*

|                        | CONTROL<br>(n = 40)       | SJÖGREN<br>(n = 40)      | SLE<br>(n = 40)          |
|------------------------|---------------------------|--------------------------|--------------------------|
| Sex (n)( Female/Male ) | 21/19                     | 37/3c                    | 34/6a                    |
| Age                    | 35.75 $\pm$ 11.72         | 49.33 $\pm$ 12.96c       | 40.65 $\pm$ 10.23a,d     |
| RDW, %                 | 13.59 $\pm$ 0.95          | 14.83 $\pm$ 2b           | 15.1 $\pm$ 2.4c          |
| MPV, fl                | 8.28 $\pm$ 0.74           | 8.64 $\pm$ 1.14          | 8.67 $\pm$ 1.12          |
| NLR                    | 2.28 $\pm$ 1.6            | 2.3 $\pm$ 0.83           | 2.72 $\pm$ 1.49          |
| PLT, 103 / $\mu$ L     | 272900.00 $\pm$ 64.202.32 | 269950.00 $\pm$ 72527.60 | 268275.00 $\pm$ 89160.18 |

RDW: Red blood cell distribution width, MPV: Mean platelet volume, NLR: Neutrophil/lymphocyte ratio, PLT: Platelet.

\* Values are given as mean $\pm$ standard deviation.

When compared with the control group: ap<0.05, bp<0.01, cp<0.001 When compared with the Sjögren group: dp<0.001

## Discussion

The proportion of women and men in the groups of SS and SLE patients that were taken into the study was much higher for women. This was due to the fact that both diseases were seen more in women. Mean age of healthy control group was close to patient groups' mean age. The association of hematological markers with various diseases has been shown previously with different studies [19,20]. In a study by Zhi-De Hu and colleagues in patients diagnosed

with Primer Sjögren, RDW and NLR values were significantly higher than in the healthy control group [19]. It was also found that these elevations in the same study were related to disease activity [19]. In this study, RDW, NLR and MPV values were also higher in patients with both Sjögren and SLE in comparison with the healthy control group. However, the elevation in the RDW was statistically significant while the height in the MPV and NLR was not statistically significant. Besides, the number of PLTs in our patients with SLE and Sjögren is lower than in the healthy control

group. This decrease was not statistically significant. These data were consistent with previous studies [19]. Our current findings suggest that MPV, RDW, PLT numbers and NLR may be used as an inflammatory marker. In another study conducted by Demircan et al., RDW and NLR values of patients with major depression were found to be inevitably higher than the healthy control group [20]. It is the opinion that hematological markers present in the light of these data can be used not only as an inflammatory marker but also in the diagnosis and follow-up of various diseases. In a study by Sun-Yi Chen et al., Patients who were followed-up with SLE diagnosis were split into active and inactive groups, and their hematological indices were compared [21]. In this study, the platelet count of those with active disease was found to be lower than statistically meaningful ( $p = 0.003$ ). However, when MPV values were examined, there was no statistical significance between active groups and inactive ones ( $p = 0.21$ ). In this present study, also, the PLT counts of the patient groups were lower than those of the healthy control group. However, these decreases were not statistically significant. A statistically significant correlation also couldn't be found between the ESR and CRP values of this present study and the hematological markers. These findings indicate that hematological markers can be used not only in diagnosis of the illness but also in the tracing of their activities. One of the limitations of the study is that the markers studied on are not correlated with disease activity scores. Another limitation is that the patient numbers are low.

## Conclusion

As a result; in this present study, it is found that in groups with SS and SLE, RDW, MPV and NLR values were lower than those of healthy control group. The data that have been obtained through the study suggest that hematological markers which are inexpensive in the health centers and which can be taken care of in almost every health center can be used for diagnosis and follow-up of many diseases, especially inflammatory diseases. On the other hand, this study needs to be supported by studies in which larger patient groups are involved.

## Limitations

There are some limitations in our study. The fact that the markers we work with are not correlated with disease activity scores, it is a cross-sectional research and the count of the patient group is small. The number of women in the SS and SLE patient groups we included in the study was higher than the number of men. The reason for this is that the patients we follow are predominantly female and that SLE and SS are more common in females than males.

## Competing interests

*The authors declare that they have no competing interest*

## Financial Disclosure

*The financial support for this study was provided by the investigators themselves.*

## Ethical approval

*This present research was accepted by local ethics committee and informed consent forms and permits were obtained from all participants before joining the study.*

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